CLAIMS:

1. A vertical field type MRI apparatus for forming magnetic resonance images, including:

* at least one field generating superconducting coil system (20) for producing a substantially homogeneous magnetic field in an imaging volume (18) of the apparatus,
    * which coil system includes:
        * a round outer coil (28) that is situated in an outer coil plane (32);
        * a round supplementary coil (30) that is situated within the outer coil (28),

characterized in that

* the energizing of the outer coil (28) and of the supplementary coil (30) is such that these coils generate magnetic fields of opposite direction,
* the supplementary coil (30) is also situated in the outer coil plane (32), and
* the ratio $D_a/D_o$ of the diameter $D_a$ of the supplementary coil (30) to the diameter $D_o$ of the outer coil (28) is between 0.7 and 0.9.

2. An apparatus as claimed in claim 1and provided with three further round coils (34, 36, 38), each of which is situated in a respective further coil plane, the outer coil plane (32) being situated between the imaging volume (18) and each of the further coil planes.

3. An apparatus as claimed in claim 2, wherein the three further round coils are situated on a conical surface (48), the apex of the conical surface being directed away from the imaging volume.

4. An apparatus as claimed in one of the preceding claims and provided with a second field generating superconducting coil system (20b) for producing the substantially homogeneous magnetic field in the imaging volume (18) of the apparatus,

* which second coil system (20b) includes:

* a second round outer coil (28b) which is situated in a second outer coil plane (32b) and whose diameter is larger than that of the first outer coil (28a),

* a second round supplementary coil (30b) which is situated within the second outer coil (28b) and in the second outer coil plane (32b),

* the energizing of the second outer coil and of the second supplementary coil being such that these coils generate magnetic fields of opposite direction.

5. An apparatus as claimed in claim 4 and provided with four further round coils (40, 42, 44, 46), each of which is situated in a respective further coil plane, the outer coil plane (32b) being situated between the imaging volume (18) and each of the further coil planes.

6. An apparatus as claimed in claim 5, wherein the four further round coils are situated on a conical surface (50), the apex of the conical surface being directed away from the imaging volume (18).

7. An apparatus as claimed in one of the claims 4 to 6 and provided with at least a first gradient coil system (52a) and a second gradient coil system (52b) for producing a magnetic gradient field in the imaging volume of the apparatus,

* each gradient coil system including a flat main gradient coil (72) and a shielding coil (74), and

* the first gradient coil system (52a) being situated in a space within said first field generating superconducting coil system (20a) and the second gradient coil system (52b) being situated in a space within the second field generating superconducting coil system (20b).

8. An apparatus as claimed in claim 7, wherein at least one of the shielding coils extends across a substantially conical surface whose apex is directed away from the imaging volume.

9. An apparatus as claimed in one of the claims 4 to 6 and provided with a first and a second container (82, 84) for the first and the second field generating superconducting coil system (20a, 20b), respectively, said containers being arranged to contain a cryogenic medium (92) and communicating with one another in order to exchange the cryogenic

medium, one of the containers being provided with a pressure connection (98) for controlling the pressure in the containers as desired.